
Aeroallergen sensitization rates in military children with rhinitis symptoms

Christopher W. Calabria, MD, and John Dice, MD

Background: Childhood sensitization rates for many aeroallergens are underreported.

Objectives: To examine aeroallergen sensitization rates in military children undergoing skin testing for rhinitis and investigate the timing of atopic development for perennial and seasonal allergens.

Methods: A skin testing database was retrospectively analyzed. Children 18 years and younger referred for rhinitis underwent skin prick testing to either a screening panel of 8 tests or a standard panel of 51 allergens.

Results: A total of 209 patients underwent skin testing to the 8-test panel. Of these patients, 35.4% had at least 1 positive result. Atopy increased with age, from 6.3% in those younger than 1 year to 58.8% in those 5 years old. The most common allergens were mold mix (16.3%), cat (13.2%), dust mite mix (11.4%), tree mix (9.4%), and grass mix (9.4%). Only 4.0% were sensitized to seasonal aeroallergens before the age of 3 years. A total of 345 children underwent testing to a 51-allergen panel. A total of 80.3% had at least 1 positive test result, and the average number of positive test results was 11.4. Both the percentage of atopy and the average number of positive skin test results increased with age. The most common allergens were grasses, *Alternaria*, and cottonwood. Thirty-two of 51 allergens were positive in 20% or more children. Rates for many underreported allergens are presented.

Conclusions: In children, aeroallergen sensitization rates are high and increase with age. Perennial allergens predominate up to the age of 3 years. Rates for many underreported allergens are presented. Although performed in a military population, these results should be applicable to many practices.

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INTRODUCTION

Allergists commonly skin test children with rhinitis to determine if their symptoms are allergic in origin. Prior skin test studies in children have focused on small numbers of similar allergens and narrow age ranges. Investigators have focused on skin test reactivity as a risk factor for the persistence of asthma¹ and a marker for asthma severity.² Sensitization has been analyzed in association with lower respiratory tract symptoms,³ airway hyperresponsiveness,^{4,5} atopic dermatitis, and allergic rhinitis.^{6,7} Others have investigated the effect of parental atopy and allergen avoidance on sensitization rates.^{8–12} This study focuses on children of any age undergoing skin testing to either a limited screening panel or a larger panel of 51 allergens, a scenario routinely seen in a typical allergy clinic. The purposes of this study were to investigate the timing of atopic development, compare the results of the 2 panels, evaluate the differences in sensitization to perennial and seasonal allergens, and present sensitization rates for many underreported aeroallergens.

This is also the first study that focuses on skin test reactivity in children of military families. The military population is unique because of its mobility, with most families relocating every few years. Between 2000 and 2001, 37% of military

personnel relocated compared with only 15% of civilians.¹³ Military personnel were 9 times more likely to relocate within the United States and 4 times more likely to relocate outside the United States. We speculate that this increased mobility might increase the diversity of allergic sensitization in these children.

METHODS

A retrospective analysis of all available skin test results during a period of 2.5 years was performed at a single site. A total of 562 children 18 years or younger referred for rhinitis underwent skin prick testing with the Quintip device (Hollister-Stier, Spokane, WA; manufactured in England) to either an 8-test screening panel (with several allergen mixes) or a larger standard panel of 51 aeroallergens. The smaller panel was used as a screen for atopy, and the larger standard panel was used to provide a more detailed analysis of potential allergic triggers, especially if considering immunotherapy. A positive skin test result was defined as a wheal size of 3 mm or larger with flare read at 15 minutes. Atopy was defined as at least 1 positive skin test result. Histamine (1 mg/mL) and 50% glycerin diluent were used as the positive and negative controls, respectively. Patients were excluded if they had either a negative histamine or positive diluent control ($n = 8$). The Wilford Hall Medical Center Institutional Review Board approved the exempt study protocol.

The aeroallergens, concentrations, and manufacturers are listed in Table 1. Notably, the screening panel contained several mixes. These included a tree mix (mountain cedar and

Department of Allergy and Immunology, Wilford Hall Medical Center, Lackland AFB, Texas.

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Table 1. Extracts for the 51-Allergen Standard Panel and 8-Test Screening Panel

Extract	Strength	Manufacturer
Ash, white	1:20 wt/vol	Hollister-Stier, Spokane, WA
Birch mix	1:10 wt/vol	Hollister-Stier
Box elder and maple mix	1:10 wt/vol	Hollister-Stier
Cottonwood, common	1:20 wt/vol	Hollister-Stier
Cypress, Arizona	1:20 wt/vol	Hollister-Stier
Elm, American	1:20 wt/vol	Hollister-Stier
Hackberry	1:20 wt/vol	Hollister-Stier
Mesquite	1:20 wt/vol	Greer, Lenoir, NC
Mountain cedar	1:10 wt/vol	Hollister-Stier
Mulberry mix	1:20 wt/vol	Hollister-Stier
Oak mix (red, white, Virginia live)	1:10 wt/vol	Hollister-Stier
Olive	1:10 wt/vol	Hollister-Stier
Palm, queen	1:20 wt/vol	Greer
Pecan	1:10 wt/vol	Hollister-Stier
Pine	1:20 wt/vol	Hollister-Stier
Sycamore, American	1:20 wt/vol	Hollister-Stier
Walnut, black	1:10 wt/vol	Hollister-Stier
<i>Alternaria tenuis</i>	1:10 wt/vol	Hollister-Stier
<i>Aspergillus fumigatus</i>	1:10 wt/vol	Hollister-Stier
<i>Aspergillus niger</i>	1:10 wt/vol	Hollister-Stier
<i>Bipolaris (Curvularia specifera)</i>	1:10 wt/vol	Hollister-Stier
<i>Epicoccum nigrum</i>	1:10 wt/vol	Hollister-Stier
<i>Fusarium vasinfectum</i>	1:10 wt/vol	Hollister-Stier
<i>Helminthosporium interseminatum</i>	1:10 wt/vol	Hollister-Stier
<i>Hormodendrum cladosporides</i>	1:10 wt/vol	Hollister-Stier
<i>Penicillium notatum</i>	1:10 wt/vol	Hollister-Stier
Bahia	1:10 wt/vol	Hollister-Stier
Bermuda	10,000 BAU/mL	Hollister-Stier
Johnson	1:10 wt/vol	Hollister-Stier
Rye	100,000 BAU/mL	Hollister-Stier
Timothy	100,000 BAU/mL	Hollister-Stier
Burning bush (<i>Kochia</i>)	1:10 wt/vol	Hollister-Stier
Cocklebur, common	1:10 wt/vol	Hollister-Stier
Dock and sorrel mix	1:10 wt/vol	Hollister-Stier
Lambs quarter	1:10 wt/vol	Hollister-Stier
Marshelder and poverty mix	1:20 wt/vol	Hollister-Stier
Nettle (<i>Urtica</i>)	1:20 wt/vol	Hollister-Stier
Pigweed or careless mix	1:10 wt/vol	Hollister-Stier
Plantain, English	1:10 wt/vol	Hollister-Stier
Ragweed (giant, short, and western)	1:20 wt/vol	Hollister-Stier
Russian thistle	1:20 wt/vol	Hollister-Stier
Sagebrush or mugwort	1:20 wt/vol	Hollister-Stier
Scale, wing	1:20 wt/vol	Hollister-Stier
<i>Dermatophagoides farinae</i>	10,000 AU/mL	Hollister-Stier
<i>Dermatophagoides pteronyssinus</i>	10,000 AU/mL	Hollister-Stier
Cat hair (acetone precipitated)	10,000 BAU/mL	Hollister-Stier
Dog hair (dander)	1:10 wt/vol	Hollister-Stier
Cockroach mix: American and German	1:10 wt/vol	Hollister-Stier
Feather mix: chicken, duck, and goose	1:10 wt/vol	Hollister-Stier
Mouse epithelia	1:20 wt/vol	Greer
Rat	1:10 wt/vol	Greer
Tree mix: mountain cedar and oak mix	1:20 wt/vol	
Grass mix: Bermuda and timothy	10,000 BAU/mL	
Weed mix: ragweed mix and pigweed or careless mix	1:20 wt/vol	
Mold mix: <i>Alternaria</i> , <i>Cladosporium</i> , <i>Aspergillus</i>	1:10 wt/vol	
Dust mite mix: <i>D. farinae</i> and <i>D. pteronyssinus</i>	10,000 AU/mL	
Cat pelt	10,000 BAU/mL	
Dog	1:10 wt/vol	
Cockroach mix: American and German	1:10 wt/vol	

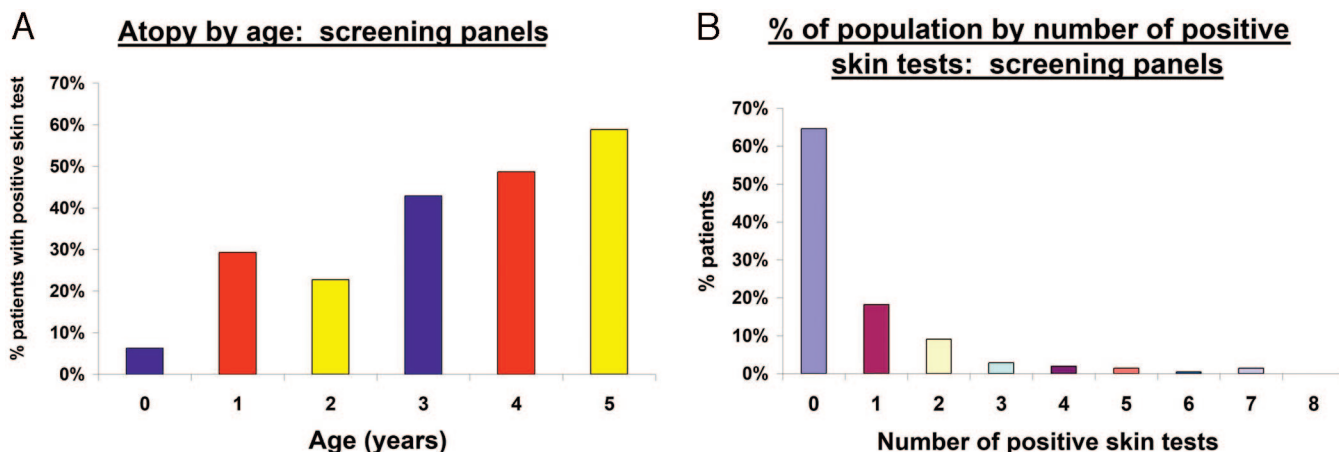


Figure 1. Percentage of atopic children by age (A) and number of positive skin test results (B).

oak), grass mix (Bermuda and timothy), weed mix (ragweed and pigweed or careless), mold mix (*Alternaria*, *Cladosporium*, and *Aspergillus*), dust mite mix (*Dermatophagoides farinae* and *Dermatophagoides pteronyssinus*), and cockroach mix (American and German). Thus, 15 aeroallergens were evaluated in the 8-test screening panel.

RESULTS

Screening Panel

A total of 209 children (118 boys and 91 girls) underwent evaluation with the 8-test screening panel. A total of 198 children (94.7%) were younger than 6 years. Seventy-four (35.4%) had at least 1 positive skin test result, with atopy increasing with age from 6.3% (age, 0–1 year) to 58.8% (age, 5 years) (Fig 1A). The average number of positive skin test results increased from 0.1 (age, 0–1 year) to 1.4 (age, 5 years). Figure 1B illustrates the population in terms of the number of positive skin test results; the most common results were for the children to have either 0 (64.6%) or 1 (18.2%) positive skin test result. A total of 17.2% of the children were polysensitized.

The most common allergens were mold mix (16.3%), cat (13.2%), and dust mite mix (11.4%) (Fig 2A). Sensitization rates for individual allergens increased with age (Fig 2B). Thirty-eight (51.4%) of 74 atopic children were monosensitized. The most common allergens responsible for monosensitization were mold, cat, and dust mite.

Perennial aeroallergens were predominant, particularly before the age of 3 years. Only 4.0% of patients were sensitized to seasonal aeroallergens before the age of 3 years; however, sensitization rates to seasonal allergens quickly increased starting at the age of 3 years (Figure 2C). Among 3-, 4-, and 5-year-olds, sensitization rates for trees (16.5%), grass (15.5%), and weeds (12.4%) were similar to those for cat (15.4%) and dust mite (17.5%), whereas the mold mix was still most common (24.7%).

Standard Panel

A total of 345 children (186 boys and 159 girls) underwent skin testing to our 51-aeroallergen panel. Typically, this panel was chosen by the allergist to give a more comprehensive investigation of potential allergic triggers and to determine if

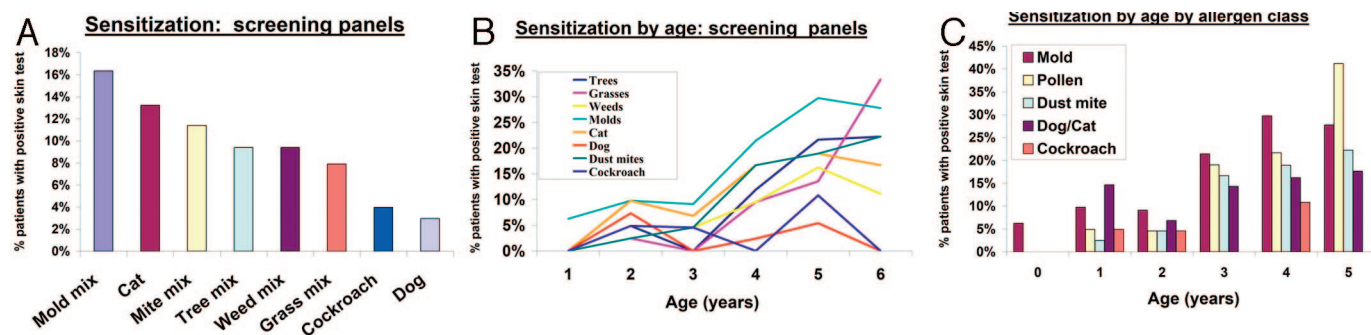


Figure 2. Screening panel sensitization results (A); sensitization for each allergen increases with age (B), and sensitization by allergen class changes with age (C).

immunotherapy was a therapeutic option. A total of 277 (80.3%) of 345 children had at least 1 positive skin test result. The average number of positive skin test results was 11.4. A total of 27% of patients were positive to outdoor allergens alone, 5% to indoor allergens alone, and 47% to both. The percentage of atopy and the average number of positive skin test results increased with age with few exceptions (Figs 3A and 3B). Thirty-two of 51 allergens tested were positive in 20% or more of the children.

Figure 3C demonstrates the population in terms of the number of positive skin test results. The most common result was for the patient to have between 1 and 5 positive skin test results (28%), followed by 0 (20%), 6 to 10 (14%), and 11 to 15 (11%). A total of 20% of the population is equally divided among 16 to 20, 21 to 25, 26 to 30, and 31 to 35 positive skin test results, each with 5%. The percentages decrease thereafter, although 2% have more than 41 positive skin test results.

The 10 most prevalent allergic sensitivities are given in Table 2. Percentages are for the entire population (not atopic patients only). The most common allergens overall were the grasses (Bahia, Bermuda, Johnson, rye, timothy; range, 30%–38%). *Alternaria* (31.9%) and *Helminthosporium* (28.7%) were the most common molds. Cottonwood (32.8%), mountain cedar (31.0%), and oak (31.0%) were the most prevalent trees, and ragweed (29.3%) was the most frequent weed. The most sensitizing environmental allergens were dust mite (*D farinae*, 25.5%; *D pteronyssinus*, 27.5%) and cat (26.7%). The most sensitizing allergens by class are listed in Table 2.

Monosensitization in standard panels was present in 23 (6.7%) of 345 patients. Cockroach, dust mite, and cat were the most common allergens implicated, followed by mouse, oak, and *Alternaria*. Despite not being among the most common allergens overall, cockroach was the most common allergen responsible for monosensitization. Grasses and weeds were not responsible for monosensitization in this patient group.

Considering point prevalence of individual allergens by age group, this study substantiates that sensitization increases throughout childhood. If one looks at year-to-year variation in point prevalence, there is not a steady increase in preva-

lence (ie, from 6 to 7 years of age). However, if you look at 2- or 4-year blocks of time (3- to 6-years-olds vs 7- to 10-year-olds), there is a consistent increase in sensitization rates. Looking at classes of allergens by age group, trees, grasses, and weeds show a steady increase through childhood. In contrast, mold and environmental sensitization rates demonstrate a plateau effect in the 7- to 10-year age group, without a significant increase in the second decade of life (Figs 4A through 4E).

Comparison of Panels

Several comparisons can be made between the 2 panels. For both panels, the rates of sensitization and the average number of positive skin test results increase with age. The rate of atopy was higher for the larger standard panel (80.3%) than the screening panel (35.4%). The most common allergens in the screening panel were mold mix, dust mite, and cat. This contrasts with the standard panel, in which 9 of the 10 most prevalent allergens are trees, grasses, and weeds.

DISCUSSION

Clinical Relevance and Unique Features

Compared with prior reports, this study is unique because it includes a wide age range of children, both a screening panel and a larger panel of allergens, and a mobile population. In addition, we present sensitization rates for many underreported aeroallergens, compare the results of the 2 panels, and substantiate prior findings on the timing of atopic development. Compared with prior studies, this study is a more accurate reflection of a typical allergy clinic, where children of all ages are skin tested to a wide variety of aeroallergens and different predetermined allergen panels. In a recent survey¹⁴ of allergists, the average number (sum of perennial, trees, grasses, weeds, and molds) of skin prick tests performed was 42.5, comparable to our 51-aeroallergen panel.

Onset of Atopy

The onset of atopy is uncommon in infancy, because only 6.3% of children younger than 1 year had a positive skin test result. In fact only 22.5% of children younger than 3 years

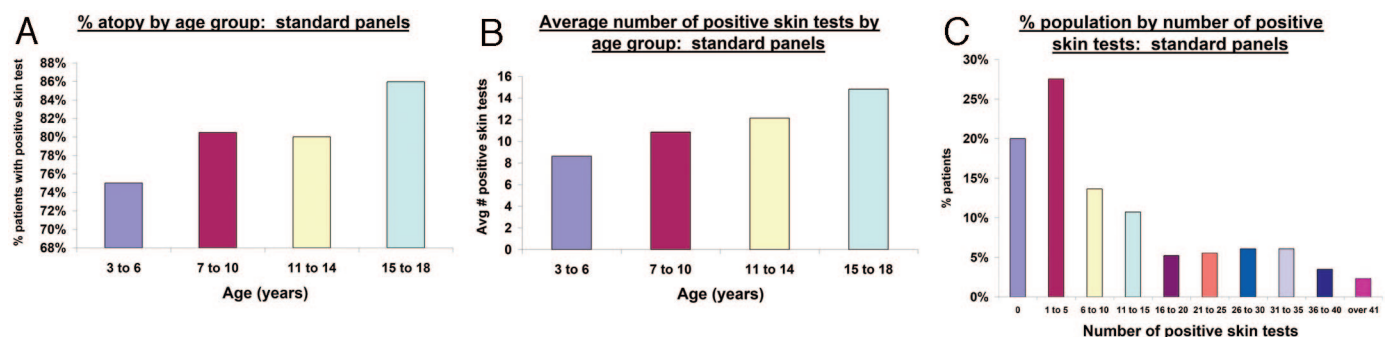


Figure 3. Percentage of atopy by age group (A), average number of positive skin test results by age group (B), and population in terms of number of positive skin test results (C).

Table 2. Most Common Allergens Overall and by Class

Allergen	Positive, %
Overall	
Bahia	38.0
Bermuda	35.9
Rye	34.8
Timothy	34.2
Cottonwood	32.8
<i>Alternaria</i>	31.9
Mountain cedar	31.0
Oak	31.0
Johnson	30.7
Ash	29.9
Trees	
Cottonwood, common	32.8
Mountain cedar	31.0
Oak	31.0
Ash, white	29.9
Mesquite	29.3
Pecan	27.8
Mulberry mix	27.0
Elm	24.1
Olive	23.2
Birch	22.9
Box elder and maple mix	22.9
Hackberry	22.9
Sycamore	22.9
Cypress	17.7
Palm	16.2
Walnut	15.7
Pine	6.4
Weeds	
Ragweed	29.3
Russian thistle	27.5
Pigweed or careless	27.0
Sage or mugwort	25.8
Plantain	23.5
<i>Kochia</i>	22.9
Marshelder or poverty	22.0
Lamb quarters	20.0
Wing scale	18.8
Dock or sorrel	17.7
Cocklebur	14.8
Nettle (<i>Urtica</i>)	13.6
Grasses	
Bahia	38.0
Bermuda	35.9
Rye	34.8
Timothy	34.2
Johnson	30.7
Molds	
<i>Alternaria tenuis</i>	31.9
<i>Helminthosporium</i>	28.7
<i>Cladosporium</i>	24.1
<i>Fusarium</i>	18.3
<i>Aspergillus fumigatus</i>	17.4
<i>Epicoccum</i>	15.4
<i>Bipolaris</i>	13.9
<i>Aspergillus niger</i>	9.0
<i>Penicillium</i>	7.2

Table 2. Continued

Allergen	Positive, %
Environmental agents	
<i>Dermatophagoides pteronyssinus</i>	27.5
Cat	26.7
<i>Dermatophagoides farinae</i>	25.5
Cockroach	12.5
Dog	10.4
Feather	7.8
Mouse	6.4
Rat	4.3

were atopic, compared with 47.9% of 3- to 5-year-olds. When atopic before the age of 3 years, 96% of children are sensitized to perennial allergens, and only 4% are sensitized to pollens. In a birth cohort of children of atopic parents, Le-Masters et al²² demonstrated that only 9% of their population was sensitized to pollens at the age of 1 year.

Although rates of pollen allergy are low in young children, we still believe that performing skin tests to pollens in children before the age of 3 years is indicated. The allergist will either accurately identify the pollen allergic child or reassure most parents that their children are not currently pollen allergic. This will enable the appropriate management in either scenario.

Starting at the age of 3 years pollens become more significant. At the age of 3 years, although perennial allergens are still more common, 44% of atopic children are also sensitized to seasonal aeroallergens. Among 3- to 5-year-olds, sensitization rates for pollens were similar to cat and dust mite, whereas the mold mix was still most common. Among older children, pollen sensitization continued to increase, and grasses were the most common allergens overall. This finding is significant because pollen sensitization has been associated with rhinitis,²⁶ with the highest independent risk for grass pollen sensitization.⁶

Although not directly evaluated in this study, viral-induced rhinitis is known to be common in young children, averaging 6 episodes a year between 2 and 6 years of age.¹⁵ Children with recurrent upper respiratory tract infections are often referred for an allergy evaluation, explaining why many young children referred for rhinitis in this study have negative skin test results.

Atopy: Prevalence and Natural History

This study demonstrates a high rate of atopy in children with rhinitis. Rates of atopy were 35.4% for the 8-test panel (which included younger children) and 80.3% for the 51-allergen panel. Of 51 allergens tested, 32 had sensitization rates of greater than 20%, and 45 had sensitization rates of greater than 10%. Prior studies on aeroallergen sensitization in children have been performed on both general and symptomatic populations, where overall rates of atopy in symptomatic populations ranged from 49% to 87%¹⁶⁻²⁶ (Table 3). Our standard panel rate is on the high end of this range, likely

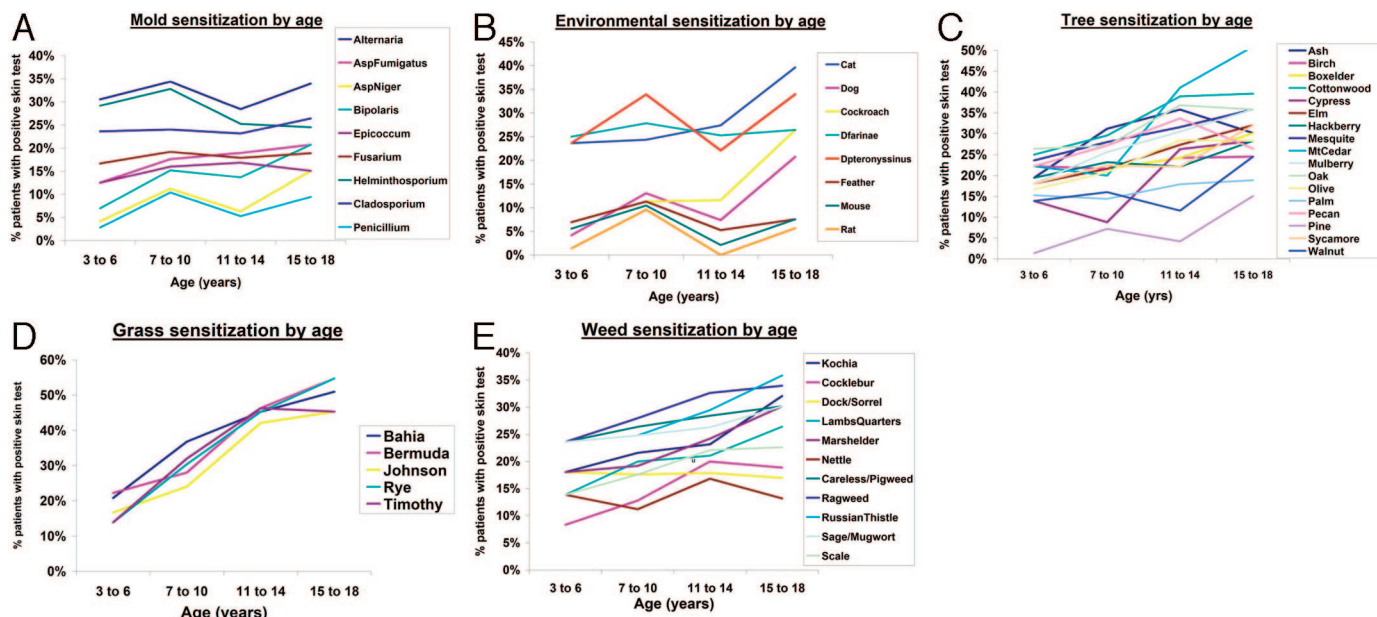


Figure 4. Sensitization by age for molds (A), environmental factors (B), trees (C), grasses (D), and weeds (E).

Table 3. Selected Studies on Prevalence of Positive Skin Test Results That Included Children^a

Source	Location	No. of study participants	Age, y	No. of skin tests	Positive skin test results, %
General population studies					
Curran and Goldman ¹⁶	Boston, MA	100	16–20	9	5
Hagy and Settupane ¹⁷	Providence, RI	765	16–20	14	17.4
Barbee et al ¹⁸	Tucson, AZ	3,012	3–75	5	34
Gergen et al ¹⁹	NHANES II	16,204	6–74	8	20.2
Arbes et al ²⁰	NHANES III	10,508	6–59	10	54.3
Leung et al ²¹	Southeast Asia (3 populations)	2,208	12–18	9	49–63
Arshad et al ⁶	Isle of Wight (birth cohort)	1,456	4	12	19.6
LeMasters et al ²²	Cincinnati, OH (children of atopic parents)	680	1	15	18
Allergic or symptomatic population studies					
Hagy and Settupane ¹⁷	Providence, RI	478	16–20	15	63.9
Hendrick et al ²³	London, England	656	10–30	22	84
Haahkala et al ²⁴	Finland	292	15–17	16	83–87
Liam et al ²⁵	Malaysia	206	8		68
Silvestri et al ²⁶	Italy	564	5 mo to 17 y	12	53.9
Current study	San Antonio, TX	209, 345	0–6, 3–18	8, 51	35.4, 80.3

Abbreviation: NHANES, National Health and Nutrition Examination Survey.

^a Adapted from Gergen et al.¹⁹

because of the higher number of allergens tested in a mobile population.

Several studies have focused on atopy as a function of age and the natural history of sensitization. The National Health and Nutrition Examination Survey (NHANES) III study analyzed positive skin test responses to 10,508 US individuals aged 6 to 59 years.²⁰ The percentage of children with at least 1 positive skin test result was 45.6% for 6- to 9-year-olds and 55.5% of 10- to 19-year-olds. Rates increased for each of the

6 allergens common to NHANES II and III from the first to second decade of life. Silvestri et al²⁶ also concluded there is an age-related increase in polysensitization and pollen sensitization in children. Our study similarly shows an increase in atopy with age in both panels. This increase in atopy applies to both the patients overall and individual allergens. In addition, the average number of positive skin test results increases with age for both panels. Although not measuring an individual patient over time, our data reflect what would be

expected in a typical allergy clinic that tests large numbers of patients at varying ages.

Kulig et al²⁸ demonstrated the natural history of sensitization for food and inhalant allergens up to the age of 6 years using in vitro testing. They showed that the prevalence of sensitization increased from the age of 1 to 6 years, primarily because of an increase in inhalant sensitization. By the age of 6 years, sensitization to outdoor allergens was twice as common. This same group²⁹ also looked at development of seasonal allergic rhinitis during the first 7 years of life. Focusing on birch and timothy grass, the incidence and prevalence of symptoms and sensitization were low during early childhood (<2%) and increased steadily with age.

Seasonal Aeroallergens

For trees, only birch has been commonly reported in previous studies. We report on a tree mix (screening panel) and 17 individual trees (standard panel). The tree mix that contained mountain cedar and oak was positive in 9.4% of children. Sensitization to birch in our study was 22.9%, higher than previous reports (10%–15%).^{24,28} Cottonwood was our most sensitizing tree (32.8%). Mountain cedar, a prolific allergen in south Texas, was positive in 31% of children. It pollinates in the winter and is known to cause “cedar fever.” A total of 31% were also positive to oak, another ubiquitous tree in our area and a prominent allergen infrequently reported. Sensitization rates were more than 20% for 10 additional trees and more than 15% for 16 of 17 trees. Notable was the low rate of sensitization to pine (6.4%).

Grass mixes have been studied multiple times (range, 2.1%–39.8%). Grass sensitization is rarely reported individually, except for Bermuda (range, 7.9%–18.1%)^{20,25} and timothy (range, 13%–23%).²⁴ In our study, the grass mix (Bermuda and timothy) was positive in 9.4% of children. The 5 grasses in the standard panel were positive in 30% to 38% of children and were the most common allergens overall.

Weed sensitization rates have been seldom reported, with only ragweed reported routinely. The weed mix was positive in 7.9%. In the standard panel, we describe rates of sensitization for 12 weeds; 8 were positive in 20% or more of patients and all were positive in 13% or more of children. The most common weeds included ragweed, Russian thistle, and pigweed. Although ragweed is likely the most prominent allergen in the group, other weeds appear to be significant as well.

Molds

The molds previously studied typically included mixes of *Alternaria*, *Aspergillus*, and *Cladosporium* (sensitization rates, 2.0%–23.4%). Notable in this study were the high rates of sensitization at young ages. In the screening panel, the mold mix was the most common allergen (16.3%). Therefore, like dust mite and cat, mold sensitization begins early and is common.

The standard panel demonstrates skin test results for 9 molds, 6 of which were positive in 20% or more of patients. *Alternaria*, *Helminthosporium*, and *Cladosporium* were the most prevalent molds, and *Alternaria* is the fifth most com-

mon allergen overall. *Bipolaris*, a common agent implicated in allergic fungal sinusitis, is positive in 13.9%. *Aspergillus* species, positive in 25% of asthma patients and the most common agents implicated in allergic bronchopulmonary aspergillosis, are present in 17.4% (*Aspergillus fumigatus*) and 9.0% (*Aspergillus niger*) of patients.

Perennial Aeroallergens

Cat, dust mite, dog, and cockroach have been studied most extensively. Dust mite sensitization has been associated with the development of asthma.⁶ Indoor aeroallergen sensitization (particularly cat, dust mite, and cockroach) has been linked to increased asthma severity² and airway hyperreactivity.⁵ Dust mite sensitization in prior studies has been widely variable: 27% to 84% for house dust,^{20,27} 6% to 93% for *D pteronyssinus*,^{6,25} and 13% to 97% for *D farinae*.^{24,25,34} Our study revealed sensitization rates of 13.4% (screening dust mite mix), 27.5% (*D pteronyssinus*), and 25.5% (*D farinae*). Cat sensitization rates (11.2% screening, 26.7% standard) were similar to prior studies (5%–29%).^{2,6,20,28} Likewise, dog sensitization rates (3.0% screening, 10.4% standard) were similar to previous investigations (0.8%–20%).^{2,21,24} Cockroach sensitization (4% screening panel, 12.5% standard panel) was on the low end of the range of other reported rates (8%–50%),^{2,21,25} likely because ours is not an inner-city population.

In addition, we report sensitization rates for feather, mouse, and rat. Mouse and rat are being recognized as increasingly important allergens in inner-city populations and occupational settings. They have been studied as part of the National Cooperative Inner City Asthma Study, in which 18% were sensitized to mouse and 19% to rat.^{30–32} Mouse and rat sensitivity were associated with trends toward increased asthma morbidity. In the occupational setting, sensitization to mouse and rat allergens is common among those working with these animals, with estimates of 10% to 32% and 12% to 31%, respectively.³³ Our rates in this pediatric study are 6.4% and 4.3%, respectively. Although less than those found in inner-city and occupational settings, our rates suggest that mouse and rat sensitization are present in a significant proportion of children.

Comparison of Panels

Overall both panels demonstrated high rates of atopy that increase with age. The average number of positive skin test results also increases with age. The difference in allergen prevalence between panels likely reflects the difference in ages of children tested. Molds, dust mite, and cat were most often positive in the screening panel, which tested patients up to 6 years of age. Grasses and other seasonal allergens were most common in the standard panel, which tested patients aged 4 to 18 years.

CONCLUSIONS

In children, aeroallergen sensitization rates are high and increase with age. Perennial aeroallergens predominate in the first 3 years of life, and seasonal allergen sensitization in-

creases starting at the age of 3 years. In the screening panel, the mold mix was most common. In the standard panel, grasses were the most common allergens. Sensitization rates for many underreported aeroallergens are also high in children and are presented. Although performed in a military population, these results should be applicable to many allergy practices.

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Requests for reprints should be addressed to:
Christopher W. Calabria, MD
Department of Allergy and Immunology
Wilford Hall Medical Center
2200 Bergquist Dr, Suite 1
Lackland AFB, TX 78236
E-mail: christopher.calabria@lackland.af.mil